

KOLOMAZNIK, Z., prom. fyzik

Problems of measuring the temperature in cement rotary kilns.  
Stavivo 43 no.1:1-2 '65.

1. Prerovske strojirny National Enterprise, Prerov.

KOLONIC, M.

Foaming characteristics of domestic motor oils. p. 226.

NAFTA. (Institut za naftu)  
Zagreb, Yugoslavia  
Vol. 10, no. 7, July 1959.

Monthly list of Eastern European Accession Index (EEAI) LC vol. 8, No. 11  
November 1959  
Uncl.

KOLOMBO, Marijan, ing. (Rijeka)

A report on the symposium at Brighton. Hafta Jug 12 no.5:123-129  
My '61.

1. Rafinerija nafte, Rijeka.

(Petroleum industry)

MATIC, Dimitrije, inz. (Pancevo, Zarka Zrenjanina 143A); MIJATOVIC, Ivan, inz.;  
KOLOMBO, Marjan, inz.

Hydrogenation of the Aleksinac crude shale oil with a view to obtaining  
fuel and the lubricating oil. Tehnika Jug 17 no.9: Suppl. Hemindustrija  
16 no.9:1761-1769 S '62.

1. Upravnik Opitne stanice za tehnologiju aleksinackih uljnih skrilmaca,  
Pancevo (for Matic). 2. Sef istrazne grupe Opitne stanice za tehnologiju  
aleksinackih uljnih skrilmaca, Pancevo (for Mijatovic). 3. Sef  
istrazivackog laboratorija Refinerije "Boris Kidric", Rijeka (for  
Kolombo).

KOLOMBO, Marijan, inz.; JELOVICA, Romuald, prof.

Laboratory dewaxing of lubricating oils. Nafta Jung 13  
no.11/12:343-349 N-D '62.

1. Rafinerija nafte, Rijeka.

KOLOMBO, Marijan, inz.

Studies on the inhibitors for motor oils. Nafta Jug 13  
no.11/12:489-495 N-D '62.

1. Rafinerija nafte, Rijeka.

KOLOMBO, Marjan, inz.

Inhibitors for motor oils. Nafta Jug 13 no. 11/12:  
489-496 N-D '62.

1. Petroleum Refinery, Rijeka.

KOLOMBO. Mrijan, inz.; JELOVICA, Romuald, prof.

Laboratory deparaffination of lubricating oils. Nafta  
Jug 13 no. 11/12:343-349 N-D '62.

1. Petroleum Refinery, Rijeka.

KOLOMO, M.

Contribution to the examination of zinc dithiophosphates as antioxidants and bearing corrosion inhibitors in high molecular hydrocarbons. Bul sc Young 9 no.3:80 Je '64.

1. Petroleum Refinery, Rijeka.

KOLOMBO, Stanislav, inz.; CERVINKA, Josef

Measurement of the shifting of steam turbine rotors and protection against its dangers. Energetika Cz 12 no.5:234-241 My '62.

1. Vyzkumny ustav energeticky, Tanvald.

KOLOMBO, S., inz.; CERVINKA, J.

Device for protecting the turbine in case of excessive displacement or elongation of rotor or stator.  
Strojirenstvi 12 no.8:617-619 Ag '62.

1. Energetický ustav, Tanvald.

KOLOMBO, Marijan, inz.

Highly alkali cylinder oils. Nafta Jug 14 no.4:109-113 Ap '63.

1. Rafinerija nafte "Boris Kidric", Rijeka.

KOLOMBO, St., inz. (Tanvald); CERVINKA, J. (Tanvald)

Noncontact pickup of axial movements of rotating bodies.  
Energetica Cz 13 no.8:446-447 Ag '63.

KOLOMENKIN, A., inzhener-mayor

Device for grinding bearings. Tyl 1 snab.Sov.Voor.Sil 21  
no.1:87-88 Ja '61.

(MIRA 14:6)

(Bearings) (Grinding machines)

ALTAYEV, S.S., dots., kand.tekhn.nauk; GOL'DIN, S.Yu.; ZAROVKINA, N.S.;  
KONSTANTINOVSKIY, D.Ya.; KOLOMENKIN, Ye.I.; KASPER, M., red.;  
DOMOVSKAYA, G., tekhn. red.

[Handbook for the assembler in large-element housing construction]  
Spravochnik montazhnika na krupnoelementnom zhilishchnom stroitel'-  
stve. Minsk, Gos.izd-vo BSSR, 1962. 359 p. (MIRA 15:7)  
(Building) (Apartment houses)

KOLOMENSKAYA, L. K.

Kolomenskaya, L. K.

"The orthographic dictionary as an aid in teaching the Russian language in the fifth through seventh classes of the intermediate school."  
Moscow City Pedagogical Inst imeni V. P. Potemkin. Moscow, 1955.  
(Dissertation for the Degree of Candidate in Pedagogical Sciences).

Knizhnaya letopis'  
No. 15, 1956. Moscow.

ABOLENSKAYA, A.V.; KOZIN, N.I.; KOLOMENSKAYA, O.A.

Use of novocaine in a prolonged attack of paroxysmal tachycardia  
in an infant. Vop. okh. mat. i det. 3 no.1:91-93 Ja-F '59. (MIRA 12:2)

1. Iz Gor'kovskogo pediatricheskogo nauchno-issledovatel'skii instituta  
Ministerstva zdravookhraneniya RSFSR (dir. A.A. Prokof'yev).  
(ARRHYTHMIA) (NOVOCAINE)

KOLOMENSKAYA, O.A.

Changes in the higher and vegetative nervous activity and in the electrocardiographic data in the clinical aspects of the first attack of rheumatic fever in school age children. Vop.okh.mat. i det. 4 no.4:13-18 JI-Ag '59. (MIRA 12:12)

1. Iz kliniki Gor'kovskogo pediatricheskogo nauchno-issledovatel'skogo instituta (dir. - N.P. Shutova, rukovoditel' - N.I. Kozin) Ministerstva zdavookhraneniya RSFSR.  
(NERVOUS SYSTEM) (RHEUMATIC FEVER)

ABOLENSKAYA, A.V.; KOZIN, N.I.; KOLOMENSKAYA, O.A.

Use of novocaine in a lingering attack of paroxysmal tachycardia  
in a child. *Pediatrics* 37 no.9:90 S '59. (MIRA 13:2)

1. Iz Gor'kovskogo pediatricheskogo nauchno-issledovatel'skogo insti-  
tuta Ministerstva zdavookhraneniya RSFSR.  
(NOVOCAINE) (ARRHYTHMIA)

KOLOMENSKAYA, O.A.

Changes in the higher and vegetative nervous activity and in electrocardiographic data during the first attack of rheumatic fever in children of school age. Vop. okh. mat. i det. 5 no.6: 15-20 N-D '60. (MIRA 13:12)

1. Iz kliniki Gor'kovskogo pediatricheskogo nauchno-issledovatel'skogo instituta Ministerstva zdravookhraneniya RSFSR (direktor - A.A. Prokof'yeva, nauchnyy rukovoditel' N.I. Kozin).  
(RHEUMATIC FEVER) (ELECTROCARDIOGRAPHY)  
(NERVOUS SYSTEM)

ACCESSION NR: AF4047462

S/0120/64/000/005/0079/0080

Authors: Mavlov, V. S.; Kolomenskaya, T. I.; Vostokov, I. I.; Lukin, M.V.

TITLE: Generation of minority carriers in silicon by fast electrons

SOURCE: Priborv\* i tekhnika eksperimenta, no. 5, 1964, 70, 80

Subject: Semiconductor research, silicon counter

ABSTRACT: The theoretical spatial distribution of the ionization energy loss in silicon by B. Ya. Yurkov (Zh. tekhn. fiz., 1959, 29, 11, 2) has been experimentally verified. A silicon counter was prepared by the method of B. Ya. Yurkov. Experimental curves of the average ionization loss vs. penetration, for electron beams with initial energies of 250, 500, 750, and 900 kev are presented. Within the usual experimental errors, the

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ACCESSION NR: AP4047462

curves show satisfactory agreement with the theoretical curve. Orig. art. has:

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova  
(State University)

SUBMITTED: 13Nov63

ENCL: 00

INT CODE: EC

NO REF SOV: 002

OTHER: 003

VAVILOV, V.S.; KOLOMENSKAYA, T.I.; VINTOVKIN, S.I.; CHUKICHEV, M.V.

Generation of nonequilibrium carriers by fast electrons in  
silicon. Prib. i tekhn. eksp. 9 no.5:79-80 S-O '64.

(MIRA 17:12)

1. Fizicheskii fakul'tet Moskovskogo gosudarstvennogo  
universiteta.

VENEDIKTOVA, M.G.; KOLOMENSKAYA, Ye.A.; GRUSHINA, A.G.

Changes in the cardiovascular system in myasthenia. Trudy 1-go  
MMI 24:169-176 '63 (MIRA 17:3)

PEREL'MAN, L.B.; SHTUL'MAN, D.R.; KOLOMENSKAYA, Ye.A.; SMIRNOV, Yu.K.;  
FISHMAN, M.N. (Moskva)

Ocular form of myasthenia gravis. Klin. med. 41 no.6:127-  
135 Je '63. (MIRA 17:1)

1. Iz laboratorii klinicheskoy neyrofiziologii (rukovoditel' -  
prof. N.I. Grashchenkov) AMN SSSR i kliniki nervnykh bolezney  
(dir. V.V. Mikheyev) I Moskovskogo meditsinskogo instituta  
imeni I.M. Sechenova.

L 10768-66

ACC NR: AP5028178

SOURCE CODE: UR/0246/65/065/008/1152/1157

AUTHOR: Vaysfel'd, I. L.; Kolomenskaya, Ye. A.

ORG: Laboratory of Neurohumoral Regulation AN SSSR and Laboratory of Clinical Neurophysiology AMN SSSR, Moscow (Laboratoriya neyro-gumoral'noy regul'yatsii AN SSSR i laboratoriya klinicheskoy neyrofiziologii AMN SSSR)

TITLE: Dynamics of urinary excretion of 5-hydroxyindolacetic acid by myasthenic patients

SOURCE: Zhurnal nevropatologii i psikiatrii, v. 65, no. 8, 1965, 1152-1157

TOPIC TAGS: serotonin, thymus, nervous system disease, myasthenia, adrenocortotropic hormone

ABSTRACT: Seventy-five myasthenic patients (52 females and 23 males) ranging in age from 15 to 56 years of age were studied in relation to the urinary excretion of the serotonin metabolite, 5-hydroxyindolacetic acid (HIA), after administration of anticholinesterase agents, ACTH, and thymectomy. The level of HIA excretion in patients with symptoms of central nervous system (chiefly diencephalic) disorders was much higher than in those with the so-called pure myasthenia, presumably because of the higher rate of metabolism resulting from involvement of the central hypothalamic formations in the process. Administration of anticholinesterase agents, which provided

UDC: 616.74 009.54-07 : 616.633.757-07

Card 1/2

L 10768-66

ACC NR: AP5028178

symptomatic relief, intensified HIA excretion. In most patients with normal HIA excretion, ACTH reduced the amount excreted on the day of injection or had no significant effect, but in half the patients with low excretion, ACTH on the day of injection greatly increased the amount of HIA excreted. Examination of 25 patients before and after thymectomy revealed a distinct relationship between the dynamics of HIA excretion and motor function. A marked improvement was noted in only 5 out of 15 patients with no significant fluctuations in HIA excretion before and after surgery. However, 7 out of 10 patients in whom the excretion of HIA increased after thymectomy improved considerably. The authors concluded that the thymus plays a role in the regulation of serotonin metabolism. Orig. art. has: 3 figures, 3 tables.

SUB CODE: 06/

SUBM DATE: 02Aug63/

ORIG REF: 006/

OTH REF: 009

CC  
Card 2/2

KOLCHENSKIY, A.A.

Radiation from a magnetic monopole in a medium. Vest.Mosk.un.  
Ser.3:Fiz.,astron. 17 no.6:56-58 N-D '62. (MIRA 15:12)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo  
gosudarstvennogo universiteta.  
(Cherenkov radiation)

KOTOV, V.I., kand.fiz.-matem.nauk (Dubna); VEKSLER, V.I., akademik; VLADIMIRSKIY, V.V.; SETVAK, M., doktor (Chekhoslovakiya); MINTS, A.L., akademik; DZHELEPOV, V.P., prof.; VAL'TER, A.K., prof.; KOLOMENSKIY, A.A., prof.

Accelerators of the future; articles and speeches of the participants in the international conference in Dubno. Priroda 53 no.1:44-56 '64.  
(MIRA 17:2)

1. Chlen-korrespondent AN SSSR (for Vladimirskiy).

USSR/Physics - Electrodynamics, Energy Loss 1 Jul 52

"Problem Concerning the Energy Losses of by a Uniformly Moving Charge," B. Bolotovskiy, A. Kolomenskiy

"Dok Ak Nauk SSSR" Vol LXXXV, No 1, pp 59-61

Acknowledges the interest and discussion of V. I. Veksler, Corr Mem, Acad Sci USSR. States that the influence of the atoms of a medium decreases the energy losses of a charge moving in it, which occurs because of the screening of the charge's field arising (i.e., screening) in consequence of polarization. Shows that one can obtain a unique

224197

(single-valued) expression for the complete energy losses of a particle moving in a transparent medium without resorting to the introduction of damping. Submitted by Acad D. V. Skobel'tsyn 30 Apr 52.

224197

KOLOMENSKIY, A.

KOLOMENSKIY, A.

FA 234T105

USSR/Physics - Charged Particles

21 Oct 52

"Loss of Energy by Charged Particle Moving in an Anisotropic Medium," A. Kolomenskiy

"Dok Ak Nauk SSSR" Vol 86, No 6, pp 1097-1099

Purpose of present work is primarily to obtain an expression also for ionizational losses in an anisotropic medium (the case for the isotropic medium was considered by I. Tamm, I. Frank, 1937; Fermi, 1940; L. Landau, 1950). Shows that subject losses in an anisotropic medium possess interesting peculiarities not occurring in the isotropic case

234T105

and unnoticed by V. L. Ginzburg in his work ("Zhur Ekspes i Teoret Fiz" 10, 1940). Acknowledges aid of Prof V. L. Ginzburg. Submitted by Acad D. V. Skobel'tsyn 20 Aug 52.

234T105

KOLOMENSKIY, A. A.

USSR/Nuclear Physics - Quantum electrodynamics

FD-487

Card 1/1 : Pub. 146-4/18

Author : Kolomenskiy, A. A.

Title : ~~Electrodynamics of a gyrotropic medium~~

Periodical : Zhur. eksp. i teor. fiz., 24, 167-176, Feb 1953

Abstract : Obtains formulas for radiated energy and radiation fields of charges moving in a gyrotropic medium. Applies these formulas to the case of oscillator radiation and to the case of the radiation of an electron moving in a specified medium with constant velocity (Cherenkov's effect). Indebted to Profs. V. I. Veksler and V. L. Ginzburg. 5 references, including 2 foreign.

Institution : Physics Institute imeni Lebedev, Acad. Sci. USSR

Submitted : September 24, 1952

S/058/60/000/004/001/016  
A003/A001

Translation from: Referativnyy zhurnal. Fizika, 1960, No. 4, p. 24, # 7785

AUTHORS: Burshteyn, E.L., Veksler, V.I., Kolomenskiy, A.A.

TITLE: The Stochastic Method for Accelerating Particles 19

PERIODICAL: V sb.: Nekotoryye voprosy teorii tsiklicheskih uskoriteley, AN SSSR, Moscow, 1955, pp. 3-6

TEXT: The stochastic method of particle acceleration is briefly reviewed. It is assumed that the charged particle passes consecutively through a series of accelerating gaps, to which an electric voltage variable in time is applied; at the same time the phase of the accelerating voltage at the moment of the particle passage is a random value. In the calculations it was assumed, for simplicity's sake, that the accelerating voltage takes only two values  $+V_0$  and  $-V_0$ . Under these conditions the probability  $W$  of the acceleration of the particle to an energy of  $E_k = keV_0$  is determined, where  $k$  is an integer. The value of  $W$  proved to be

VB

Card 1/2

The Stochastic Method for Accelerating Particles

S/058/60/000/004/001/016  
A003/A001

$W_k = eV_0/2Ek$ . The possibility of a stochastic process of acceleration in cyclic accelerators is pointed out.

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B

Ya.M.

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

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S/058/60/000/004/002/016

AOO3/AOO1

21.2100

Translation from: Referativnyy zhurnal. Fizika, 1960, No. 4, p. 28, # 7807

AUTHORS: Kolomenskiy, A.A., Petukhov, V.A., Rabinovich, M.S.

TITLE: A New Accelerator of Charged Particles: The Ring-Shaped Phasotron 19

PERIODICAL: V sb.: Nekotoryye voprosy teorii tsiklicheskih uskoriteley. AN SSSR, Moscow, 1955, pp. 7-12

TEXT: The operational principle of the ring-shaped phasotron, a cyclic accelerator with a constant magnetic field, was briefly explained. The ring magnet consists of equal sections, each of which contains 2 sectors with the angular openings  $\nu_1$  and  $\nu_2$ . The directions of the magnetic field in adjacent sectors are taken to be of opposite signs, so that the curvature centers of the orbit segments  $O_1$  and  $O_2$  lie on different sides of the ring. In relation to  $O_1$  the field increases along the radius ( $n_1 < 0$ ), in relation to  $O_2$  it decreases ( $n_2 > 0$ ). The alternation of the signs of  $n_1$  and  $n_2$  in the case of sufficiently large values of  $|n_1|$ ,  $n_2$  and the number of sections  $N$  ( $n$  of the order of hundred,  $N$  of the order of several tens) ensures strong focusing both in the radial and the axial (along the axis of the installation) directions. At the same time the

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S/058/60/000/004/002/016

A003/A001

A New Accelerator of Charged Particles: The Ring-Shaped Phasotron

fast increase in the absolute magnitude of the magnetic field in the narrow ring (e.g., according to the law  $H \exp(n\varphi/r)$ , where  $\varphi = r - r_{init}$ ) makes the acceleration from low initial energy values possible. The essential advantage of the ring phasotron is the absence of the critical energy at  $v_2 > v_1$ . The motion of the particles in the ring-shaped phasotron is briefly considered. X

Ya.M.

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

KOLOMENSKIY, A-A.

V1591  
ACCELERATORS OF CHARGED PARTICLES. A. A.  
Kolomenskiy and N. B. Rubich. Priroda 44, 3-12(1956) Nov. 62.  
(In Russian)  
Review of linear accelerators, cyclotrons, synchrocyclo-  
trons, and cosmotrons with general description of their  
work is given. (R.V.J.)

KOLOMENSKIY, A.A.

CARD 1 / 2

PA - 1259

SUBJECT USSR / PHYSICS  
 AUTHOR KOLOMENSKIY, A.A.  
 TITLE On the Removal of the Critical Energy in a Synchrophasotron  
 with Strong Focussing.  
 PERIODICAL Zhurn. techn. fis, 26, fasc. 4, 740-748 (1956)  
 Publ. 4 / 1956 reviewed 9 / 1956

By means of the easily applied matrix method an expression for the critical energy  $E_{cr}$  in dependence of the various parameters of the device is ascertained. or From this expression follow the conditions which are necessary for the removal of  $E_{cr}$ .

Problem: A system consisting of  $N_1$  uniform elements arranged in form of a closed ring is investigated. These elements consist of blocks with a magnetic field which has a large positive or negative field gradient (system with strong focussing). The radial betatron oscillations around the main orbit are described with the help of HILL'S equation by the variable  $q$ , and the solution of this equation is, according to FLOQUET'S theorem:

$q(l) = g e^{i \mu_m l} f(l) + k.k.$ ,  $0 \leq l \leq l_0$ . Here  $l$  is the distance along the main orbit,  $g$  - a constant depending on the initial conditions,  $m$  - ordinal number of the element,  $k.k.$  - the complex-conjugated quantity.  
 It is, however, easier to compute  $f(l)$  by means of the matrix method. The matrices for the transition from  $n_1$  to  $\phi$ , from  $\phi$  to  $n_2$  etc. are given. Here  $n_1$  and  $n_2$  denote the field-free domains in the sequence  $n_1, \phi, n_2, \phi, \dots$  - the focussing block and  $\phi$  -

... MOSCOW.

KOLOMENSKIY, A.A.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1403  
AUTHOR KOLOMENSKIY, A.A.  
TITLE On the Theory of the Betatron Oscillations of Particles in  
Magnetic Systems. II.  
PERIODICAL Zhurn.techn.fiz, 26, fasc. 9, 1978-1990 (1956)  
Issued: 10 / 1956 Reviewed: 10 / 1956

Equations are set up for the determination of the  $q$ -,  $z$ -deviations from the closed orbit. Its solution is sought by means of successive approximations. When investigating oscillations in the case of the orbit being closed we find that additions occur only if the oscillations do not occur in the case of the ideal closed orbit but in that of an oscillating orbit. According to the equation, they also cause the frequency modification of betatron oscillations. Fluctuations can be most essential in strongly focussing accelerators.

Next, equations are set up for the determination of the amplitudes of betatron oscillations for linear resonances as well as resonance conditions. This is done for the simple and parametric resonance, for parametric resonance alone, and, finally, the relation between the radial ( $q$ ) and the axial ( $z$ ) oscillations are established.

In the case of nonlinear resonances it is necessary to distinguish between two types, one of which corresponds to the ideal, and the other to the oscillating field. The conditions are here written down for the realization of these resonances up to the third and fourth orders, and further also the average value equations for the mean value which determine the behavior of the amplitudes

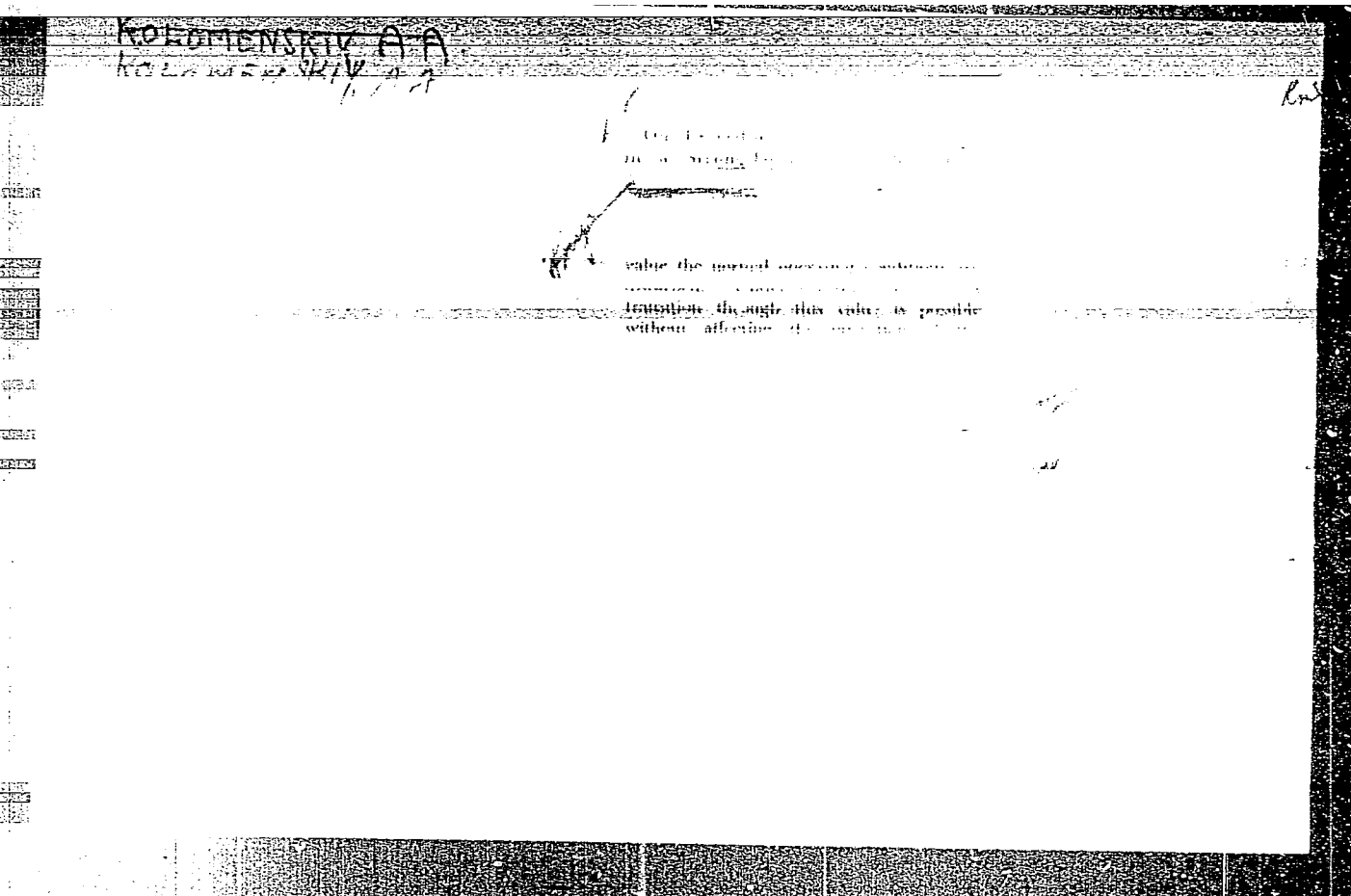
KOLOMENSKIY, A.A.; PETUKHOV, V.A.; RABINOVICH, M.S.

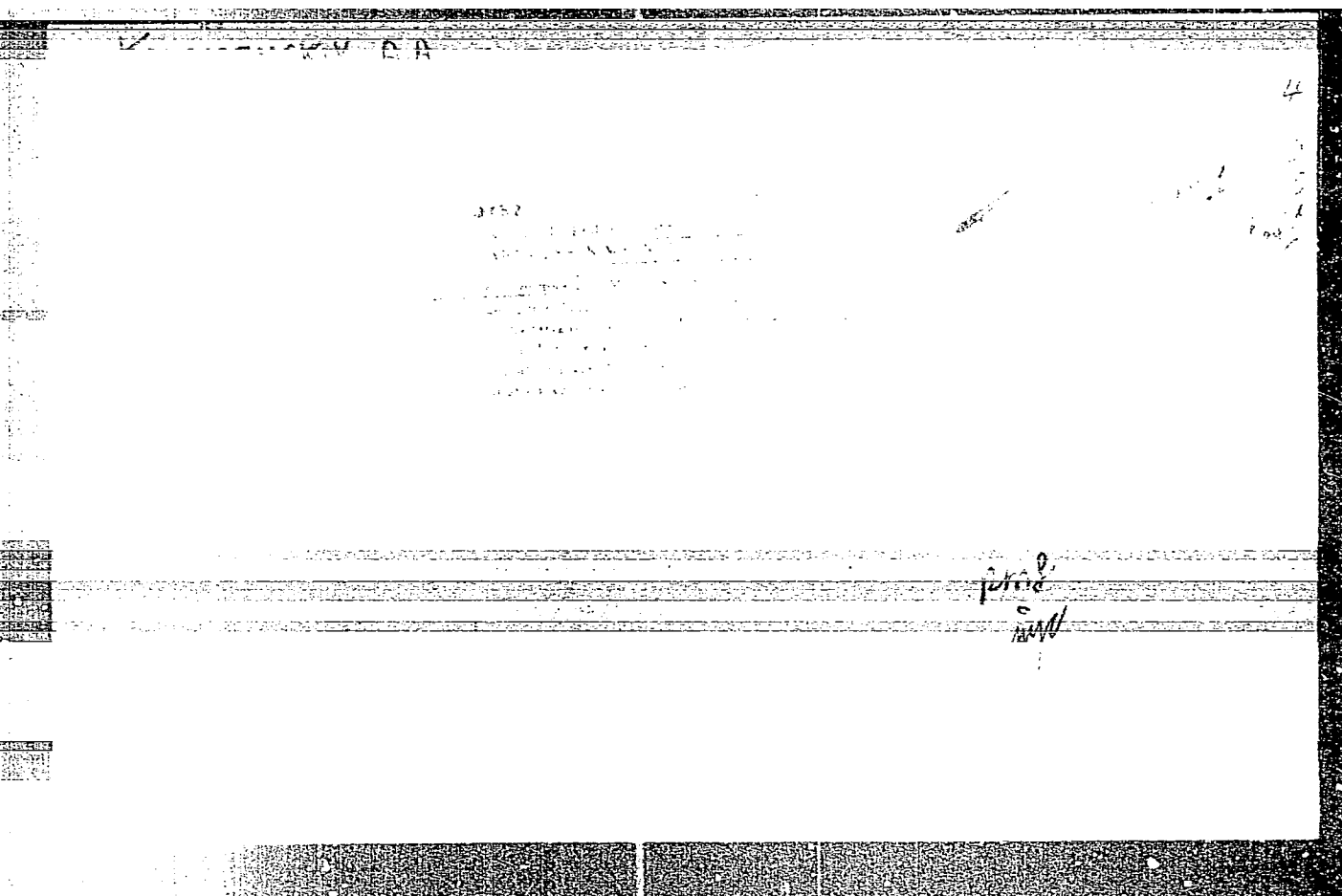
Annular synchrocyclotron. Prib.i tekhn.eksp.no.2:26-28 S-0 '56.  
(MLRA 10:2)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR.  
(Cyclotron)

VEKSLER, V.I.; YEFREMOV, D.V.; MINTS, A.L.; VEYSBNIN, M.M.; VODOP'YANOV;  
P.A.; GASHEV, M.A.; ZHYBLITS, A.I.; IVANOV, P.P.; KOLOMENSKIY,  
A.A.; KOMAR, Ye.G.; MALYSHEV, I.P.; MONOSZON, M.A.; NEVYAZHSKIY,  
I.Kh.; PRUTKHOV, V.A.; RABINOVICH, M.S.; GUBCHINSKIY, S.M.; SI-  
HEL'NIKOV, K.D.; STOLOV, A.M.

Ten Bev energy synchrocyclotron built by the Academy of Sciences  
of the U.S.S.R. Atom.energ. no.4:22-30 '56. (MLRA 9:12)  
(Cyclotron)





KOLOMENSKIY, A.A.

Category : USSR/Nuclear Physics - Instruments and Installations. Method of Measurement and Investigation C-2

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 2985

Author : Kolomenskiy, A.A., Lebedev, A.N.  
Inst : Physics Institute, Academy of Sciences USSR  
Title : On the Effect of Quantum Radiation Fluctuations on the Trajectory of an Electron in a Magnetic Field

Orig Pub : Zh. eksperim. i teor. fiziki, 1956, 30, No 1, 205-207

Abstract : The effect of quantum radiation fluctuations on the betatron oscillations of electrons moving in an annular accelerator was considered by Sokolov and Ternov (Referat Zh. Fizika, 1955, 6219) on the basis of the Dirac equation. The authors of this work have shown that the same result can be obtained with the aid of the ordinary theory of betatron oscillations, taking into account the quantum character of the electromagnetic radiation. The authors also consider the fluctuations in the instantaneous stable orbit about the average value, caused by the radiation. In a remark added in proof, the authors cite without derivation a correction equation for the betatron oscillations, differing substantially from the Sokolov and Ternov equation.

Card : 1/1

KOLOMENSKIY, A.A.

Category : USSR / Radio Physics. Generation and Conversion of Radio-Frequency Oscillations I-4

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 7250

Author : Sitenko, A.G., Kolomenskiy, A.A.  
Institut : Physical-Technical Institute, Academy of Sciences, Ukrainian SSR and Physics Institute imeni P.N. Lebedev, Academy of Sciences, USSR  
Title : Motion of Charged Particles in an Optically Active Anisotropic Medium

Orig Pub : Zh. eksperim. i. teor. fiziki, 1956, 30, No 3, 511-517

Abstract : The author considers the total energy losses (without allowances for paired collisions) of a charged particle  $q$ , moving in an optically-active anisotropic medium, and also clarifies the problem of the distribution of the losses among the polarization losses and those connected with Cherenkov radiation. The determination of the field produced by the charge, and to a calculation of the force acting on the charge. A general expression is obtained for the total energy losses of a charged particle moving in an arbitrary optically-active anisotropic medium. The general expression is used to estimate the total losses in the case of a charged par-

Card : 1/2

*kolomenskiy, A.A.*  
Category : USSR/Nuclear Physics - Instruments and Installations. Method C-2  
of Measurement and Investigation.

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 2984

Author : Kolomenskiy, A.A., Lebedev, A.N.

Inst : Physics Institute, Academy of Sciences USSR

Title : Effect of Radiation on the Motion of a Relativistic Electron in a  
Magnetic Field.

Orig Pub : Dokl. AN SSSR, 1956, 106, No 5, 807-810

Abstract : It is known that an electron moving in the magnetic field of an ac-  
celerator emits radiations and thus produces two types of phenomena.  
First, the quantum character of the radiation causes fluctuations in  
the betatron oscillations, and second, the radiation leads to the  
formation of radiation friction, which slows down or limits the fluc-  
tuation in the oscillations. The second of these effects has a purely  
classical origin and is due to the fact that the radiation of the  
electron is directed forward along its motion and is practically en-  
tirely confined within a narrow solid angle. It is shown that the

Card : 1/2

Card

2/2  
APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000823910020-

# ON THE EMISSION OF ELECTRONS IN UNIFORM MOTION

IN ELECTRON PLASMA PLASMA IN MAGNETIC FIELD

A. A. Kholmennikov, Izvestiya Akad. Nauk SSSR, Ser. Fiz. Nauk, 1966, No. 2, p. 11. In Russ.

A special electromagnetic wave is emitted by a moving electron in a plasma. It accompanies electron motion in a uniform magnetic field. The wave is characterized by a constant frequency  $\omega$  and a constant wave vector  $k$  parallel to the electron velocity. It is shown that

fraction coefficient, in isotropic media equal to  $\sqrt{\epsilon}$  (2).

For the case of electron motion in a plasma, the wave vector

be taken as  $\omega^2 = \omega_p^2 + k^2$ , where  $\omega_p$  is the plasma frequency.

It is shown that the wave is emitted by a moving electron in a plasma

if the electron velocity  $v$  is greater than the phase velocity of the wave.

It is seen that the wave is emitted by a moving electron in a plasma

if the electron velocity  $v$  is greater than the phase velocity of the wave.

It is shown that the wave is emitted by a moving electron in a plasma

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KOLOMENSKIY, A. A.

Category : USSR/Nuclear Physics - Instruments and Installations. Method C-2  
of Measurement and Investigation

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 2986

Author : Kolomenskiy, A.A.  
Inst : Physics Institute, Academy of Sciences USSR  
Title : Effect of Quantum Radiation Fluctuations of Electrons on their Motion  
in Magnetic Periodic Systems.

Orig Pub : Dokl. AN SSSR, 1956, 107, No 3, 398-401

Abstract : The effect of quantum radiation fluctuations on the betatron oscillations of electrons in ordinary (weak-focusing) accelerators was already considered earlier by the author jointly with A. Lebedev (Abstract 2985). In this work the same effect is considered for an accelerator with strong focusing. It is shown that generally speaking in accelerators with strong focusing the effect, is even weaker, than in ordinary accelerators, and presents no danger.

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KOLOMENSKIY, A. A.

APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000823910020-6

"On the Non-Linear Theory of Betatron Oscillations," paper  
presented at CERN Symposium, 1956, appearing in Nuclear Instruments,  
No. 1, pp. 21-30, 1957

KOLOMENSKIY, A.A., LEBEDEV, A.N.

"The Effect of Radiation on the Motion of Relativistic Electrons  
in a Synchrotron," paper presented at CERN Symposium, 1956, appearing in  
Nuclear Instruments, No. 1, pp. 21-30, 1957

KOLOMENSKIY, A. A., SABSOVICH, L. L.

"On the Decay of the Passage through the Transition Energy  
in Accelerators," paper presented at CERN Symposium, 1956, appearing  
in Nuclear Instruments, No. 1. pp. 21-30, 1957

KOLOMENSKIY, A. A.

**AUTHOR:** See Table of Contents

**TITLE:** Particle Accelerators (Uskoriteli elementarnykh chastits)  
Supplement Nr 4 to the Journal "Atomnaya energiya," 1957

**PUB. DATA:** Atomizdat, Moscow, 1957, 91 pp., 9200 copies

**ORIG. AGENCY:** None given

**EDITOR:** Chief Ed.: Fedorov, N. D.; Lit. Ed.: Artemov, A. I.; Tech. Ed.:  
Popova, S. M.; Corrector: Sidorova, G. V.

**PURPOSE:** This collection of articles is meant for specialists and workers  
in the field of cyclic and linear particle accelerators.

**COVERAGE:** This supplement to "Atomnaya energiya" presents papers hitherto  
unpublished, or published in part only. Some of these articles  
were read at scientific conferences. The subject matter of all  
of them is the acceleration of elementary particles in various  
accelerators.

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Particle Accelerators (cont.)

TABLE OF CONTENTS: From the Editor

Veksler, V. I.; Kolomenskiy, A. A.; Petukhov, V. A.;  
Rabinovich, M. S. Physical Principles of Operation of the  
10-Bev Proton-synchrotron (Fizicheskiye osnovy soderzheniya  
sinkhrofazotrona na 10 Bev) 4

This proton synchrotron was assigned to the United Institute  
of Nuclear Research (Ob'yedinennyy institut yadernykh  
issledovaniy), and was put into operation in April, 1957.  
Other data used in this article were obtained from the 180-Mev  
proton-synchrotron operated by the Institute of Physics of  
the AS USSR. 5

Zhuravlev, A. A.; Komar, Ye. G.; Mozalevskiy, I. A.;  
Monoszon, N. A.; Stolov, A. M.

Magnetic Properties of the 10-Bev Proton-Synchrotron at the  
United Institute of Nuclear Research (Magnitnyye kharakteristiki  
sinkhrofazotrona na 10 Bev Ob'yedinnennogo instituta yadernykh  
issledovaniy.) 15

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Particle Accelerators (cont.)

High-energy electron synchrotrons, which are characterized by the presence of intensive relativistic electromagnetic radiation of electrons in the magnetic field of the accelerator, are described. There are 2 figures, 1 table, and 15 references, 14 of which are USSR.

Ado, Yu. M.; Cherenkov, P. A.

Incoherent Electron Radiation in a Synchrotron and Certain of Its Applications in the Study of Accelerator Operation (Nekogerentnoye izlucheniye elektronov v sinkhrotrone i nekotoryye primeneniya ego dlya issledovaniya raboty uskoriteleya)

49

The relatively strong radiation of electromagnetic oscillations in a high-energy electron synchrotron (up to 100 Mev and more) is discussed. There are 5 figures and 14 references, 7 of which are USSR.

Belyak, A. Ya.; Veksler, V. I.; Kamunnikov, V. N.; Cherenkov, P. A.; Yablokov, B. N.

Characteristics of the 280-Mev Synchrotron in Operation at the Institute of Physics of the AS USSR (Osobennosti sinkhrotrona na 280 Mev ~~ФИАН~~ SSSR)

57

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APPROVED FOR RELEASE: 09/18/2001  
The synchrotron at the Institute of Physics of the AS USSR is described. This article gives design and operational data, and describes improvements which increased the quality of the synchrotron's performance. Pisarev, V. Ye., and Shvinnik, K. N. worked on the improvement of the magnetic characteristics of the acceleration chambers. Yakushkin, V. I. and Usova, I. N. worked on the development of the injection gun. Usova, I. N. performed the intensity measurements. V. A. Skorik contributed to the development of oscillators. V. S. Shirchenko was occupied with the stabilization of the upper limit of the  $\gamma$ -radiation spectrum. V. I. Travinskiy developed a method for coating the cavity resonators with a conducting layer. There are 4 tables, 12 figures, and 6 references, 1 of which is USSR.

Lobanov, Yu. M., Petukhov, V. A.

Experimental Principle of the Theory of Particle Capture in Betatron Acceleration (Eksperimental'nyye osnovy teorii zakhvata chastits v betatronnyy rezhim uskoreniya)

73

Described is research on electron capture in a betatron performed at the Second Scientific Research Institute of Physics of the Moscow State

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into account the effect of the space charge. The solution was derived from a system of equations used in the problem. This article is a part of a lecture delivered by K. N. Stepanov and A. A. Sharshanov at the All-Union Conference on High-energy Particle Physics held in May of 1956. There are 3 references, 1 of which is USSR.

Kolomenskiy, A.N.

PARTICLE ACCELERATOR: SYNCHROTRON

"Methods of Suppressing Betatron Oscillations in Strong-Focusing Electronic Synchrotrons", by A.N. Kolomenskiy and A.N. Lebedev, Physics Institute imeni P.N. Lebedev, Academy of Sciences USSR, Priboiy i Tekhnika Eksperimenta, No 1, January-February 1957, pp 22-23.

Various methods are proposed for suppressing the radiation swing of the betatron oscillations, inherent in electronic accelerators with strong focusing. These methods, which produce radiation damping, also permit a substantial reduction in the oscillation amplitudes, excited by quantum fluctuations. The methods for the suppression of betatron oscillations were also treated by M.S. Livingston in his paper delivered at the Geneva Conference in June 1956.

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KOLAMENSKIY A.A.

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1-AM  
14373e  
B. M. R.

Calculation of critical energy in the synchrotron with strong focusing. A. A. Kolamenskii. *Soviet Phys. Tech. Phys.* 1, 721-30 (1957) (English translation). See C.A. 50, p. 14373e.

KOLOMENSKIY, A. A.

AUTHOR: Burtsev, A. K. and Kolomenskiy, A. A.

120-2-2/37

TITLE: On the Theory of a Circular Phasotron. (K Teorii Kol'tsevogo Fazotrona.)

PERIODICAL: Pribery i Tekhnika Eksperimenta. 1957, No.2, pp. 11 - 15 (USSR).

ABSTRACT: The strongly focussing accelerator with a magnetic field constant in time (the circular phasotron) was first suggested in 1953 by A. A. Kolomenskiy, V. A. Petukhov and M. S. Rabinovich, (Refs. 1 and 2) then by K. R. Symon in 1955 (Ref. 3). The particle dynamics in the circular phasotron as compared with the well known strongly focussing synchrophasotron (Ref. 4) exhibit several peculiarities. In the present article an analysis is made of certain problems associated with the linear theory of betatron oscillations in the circular phasotron. From the analysis of the magnetic field of the phasotron the so called "similarity condition" (Refs. 1 and 2) is defined as  $R_2/R_1 = n_2/n_1$  (equation 4). This condition is met only for a certain set of parameters, e.g. for  $\sigma = \sqrt{sv}$ . It is shown that the "similarity condition" restricts the choice of the working point in the stable region, for given accelerator parameters. The peculiarity of the circular

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On the Theory of a Circular Phasotron.

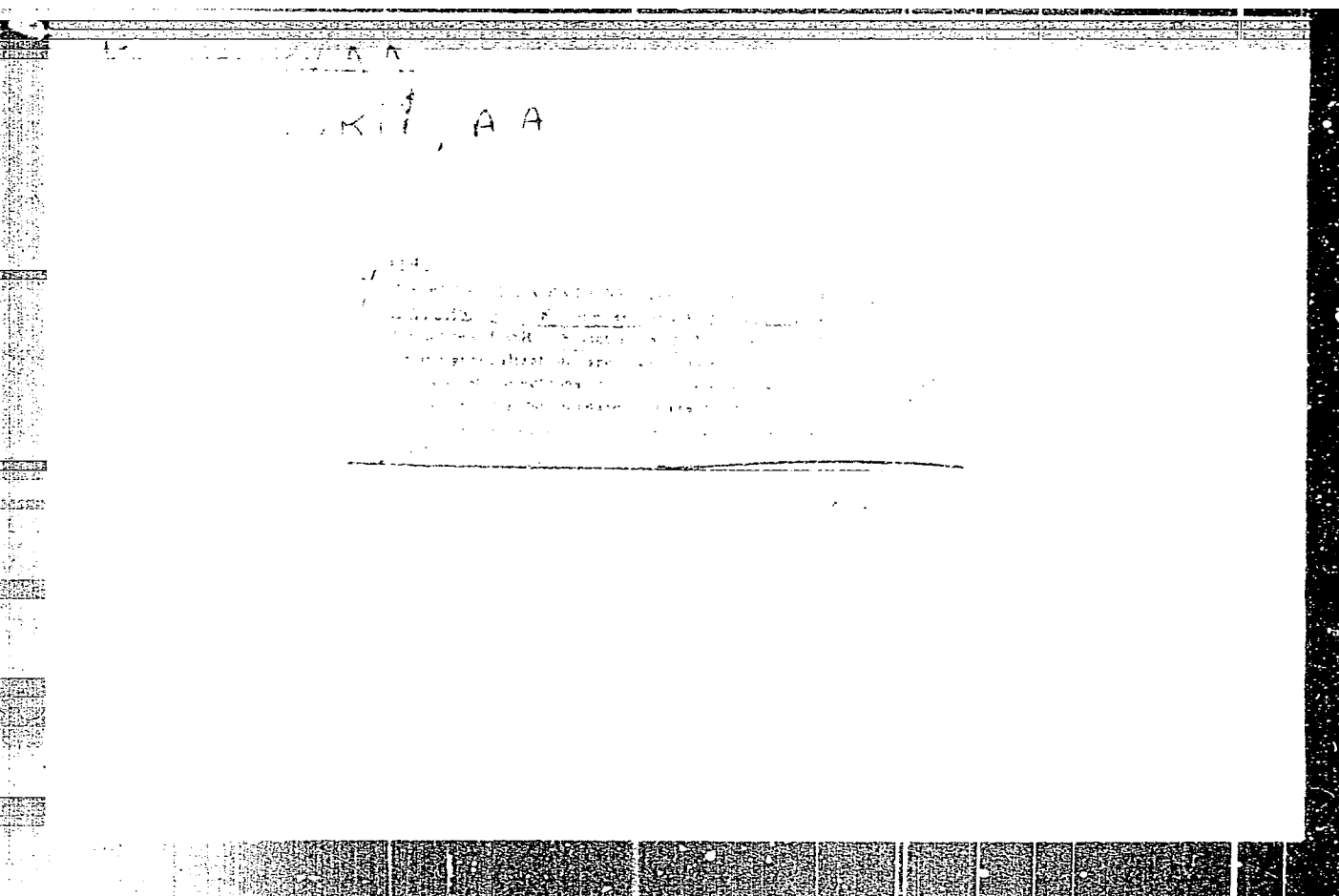
120-2-2/37

phasotron is the fact that conditions for r-(radial) and z-(vertical) oscillations are not equally important, which is due to the fact that the sector angles should not be equal to each other. The mean radius of the magnetic toroid increases to infinity for  $\nu_1 \approx \nu_2$  and in general the stability region is assymmetrical with respect to the bisector of the coordinate angle in the  $\sigma_1, \sigma_2$  plane.

The amplitude of the betatron particle oscillations is characterised by the modulus of Floquet function. It can be seen from equations 7 and 8 that this amplitude increases sharply when the working point approaches the limit of the stability region  $|\cos \mu_{r,z}| \sim 1$ . The number of the periodicity elements N and the index of the field  $n_1$  can be inter-related by equation 9 where  $\sigma_1$  is the co-ordinate of the working point in the  $\sigma_1 \sigma_2$  plane.

Only the case of parametric resonances is analysed. The equation for the allowable mean-square values of the field index n change, which leads to a resonant increase of the amplitude is given, (equation 10), and their numerical values computed for N=70 and n = 50. The relative

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KOLOMENSKIY, A.A.

VEKSLER, V.I.; KOLOMENSKIY, A.A.; PETUKHOV, V.A.; RABINOVICH, M.S.

Physical principles involved in the construction of the 10 Bev  
proton synchrotron. Atom.energ.supplement no.4:5-14 '57. (MIRA 10:10)  
(Synchrotron)

KOLOMENSKIY, A.A.

KOLOMENSKIY, A.A.; LEBEDEV, A.N.

Certain features of high-energy electronic cyclic accelerators.  
Atom.energ.supplement no.4:31-48 '57. (MIRA 10:10)  
(Particle accelerators)

VEKSLER, V.J.; VODOPJANOV, A.F.; JEFREMOV, D.V.; MINC, A.Z.; VEISBEIN, M.M.;  
GASEV, M.G.; ZEJDIC, A.J.; IVANOV, T.P.; KOLOMENSKIY, A.A.; KOMAR, E. G.;  
MALYSEV, J.E.; MONOSZON, M.A.; NEVJAZSKIY, J.Ch.; PETUCHOV, V.A.;  
RABINOVIC, V.A.; RUBCINSKIY, S.N.; SINEENIKOV, K.D.; STOLOV, A.M.;  
KULT, Karel, inz.

The synchrophasotron for particle acceleration to 10 BeV energy of the  
Soviet Academy of Sciences. Jadorna energie 3 no.1:5-9 Ja '57.

1. Ustav jaderne fysiky (for Kult).

KOLOMENSKIY, Andrey Aleksandrovich -- awarded sci degree of Doc  
Physico-Math Sci for the 10 Jun 57 defense of dissertation: "Research  
on the theory of the movement of particles in contemporary cyclical  
accelerators" at the Council, Physics Inst imeni Lebedev, AS, USSR;  
Prot No 9, 19Apr 58.  
(BMU , 10-58,1344)

KOLOMENSKIY, A. A.

AUTHOR: Kolomenskiy, A. A.

89-12-2/29

TITLE: On Accelerators With "Similar Orbits" (Ob uskoritelyakh s podobnymi orbitami)

PERIODICAL: Atomnaya Energiya, 1957, Vol. 3, Nr 12, pp. 492-497 (USSR)

ABSTRACT: The conditions, which a magnetic system has to fulfill so that the frequencies of the radial as well as the vertical betatron oscillations do not depend on the momentum of the particles to be accelerated, are deduced theoretically. These orbits are called "dynamically similar ones".  
In such systems in principal the building-up of betatron oscillations, which are related to the synchrotron oscillations and other phenomena, ought to be lacking.  
A magnetical field with  $H_0(\theta)(v_0/v)^{n_0}$ , where  $n_0$  is constant, guarantees geometrically as well as dynamically similar orbits.  
In slightly focusing accelerators with sectors and in highly focusing synchrophasotrons there are no dynamically similar orbits. In order to obtain this similarity for the first case, in addition to  $n_0$  constant it must be attained that the single sectors of the magnet have a center in common. For the specific case of the annular phasotron it is investigated:  
a) the centers of the adjacent sectors are situated on different

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KOLOMENSKIY, A. A.

AUTHOR:

KOLOMENSKIY, A. A.

56-7-58/66

TITLE:

A "Symmetric" Annular Phasotron with Crossed Beams. ("Simmetrichnyy" kol'tsevoy fazotron s vstrechnymi puchkami, Russian)

PERIODICAL:

Zhurnal Eksperim. i Teoret. Fiziki, 1957, Vol 33, Nr 7, pp 298-299 (U.S.S.R.)

ABSTRACT:

The scheme of a "symmetric" annular phasotron is given, which is a variety of the ring phasotron suggested by the author, by means of which the coincidence of two beams in one single device is made possible. This accelerating device is highly focusing, operates with a magnetic field that is constant with respect to time, and has annular sectors with alternately reversed field direction. In this device electrons (e.g. in a clockwise direction) and protons (anticlockwise) can be accelerated simultaneously under equal conditions. (With 1 Illustration and 3 Slavic References).

ASSOCIATION:

Physical Institute im. P.N. Lebedev of the Academy of Sciences of the USSR. (Fizicheskii institut im. P.N. Lebedeva Akademii nauk SSSR)

PRESENTED BY:

SUBMITTED:

15.4.1957

AVAILABLE:

Library of Congress

Card 1/1

APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000823910020-6

21(9)

AUTHORS:

Kolomenskiy, A. A., Lebedev, A. N.

TITLE:

On the Suppression of Betatron Oscillations in Strong-Focusing Electron Synchrotrons (O podavlenii betatronnykh kolebaniy v sil'nofokussiruyushchikh elektronnykh sinkhrotronakh)

PERIODICAL:

Atomnaya energiya, 1958, Vol 5, Nr 5, pp 554-557 (USSR)

ABSTRACT:

In references 2 and 3 several methods are suggested for the purpose of avoiding the building-up of oscillations and bringing about additional damping. These methods comprise  
a) the formation of a radial dependence of the amplitude of the voltage of acceleration:  $V_0 = V_0(\rho)$ ,  
b) the use of an artificially established connection between  $\phi$ - and Z-oscillations,  
c) the use of special "damped" magnets.

The effectiveness of these methods is calculated theoretically. For all three methods the decrements of damping  $\xi$  are determined. It is stated that the curvature of the trajectories in the "damped" magnets must differ from the curvatures in

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On the Suppression of Betatron Oscillations in Strong-Focusing Electron Synchrotrons

the other principal sectors. It is shown that the sum of the decrements of damping is in all cases the same and that it does not depend on the nature of the damping system. By means of the method developed it is possible to deal also with other effects in which loss of intensity is bound to the energy of the particles. There are 6 references, 5 of which are Soviet.

SUBMITTED: October 28, 1957

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66360

2/2/00

AUTHORS: Kolomenskiy, A.A. and Fateyev, A.P. SOV/120-59-5-3/46

TITLE: Determination of the Tolerance Values for the Magnetic Field Parameters in Accelerators, Using Eigenfunctions

PERIODICAL: Pribery i tekhnika eksperimenta, 1959, Nr 5, pp 22-26 (USSR)

ABSTRACT: The method of eigenfunctions may be used in studying the effect of distortions in the magnetic field on the betatron oscillations of particles in cyclic accelerators (Refs 1-4). In this approach the distortion is expanded in terms of the eigenfunctions (harmonics) of the corresponding differential operator and the solution of the equation is sought in the form of a series. The eigenfunction method is convenient in determining the tolerances for the magnetic field parameters and the development of methods for the correction of the distortions. The aim of the present note is to consider some practical applications of the eigenfunction method. The equation of betatron oscillations is, in general, of the form given by Eq (1) (Ref 5). When the righthand side of this equation is such that  $F(\theta, y) \equiv F_1(\theta)$ , where  $F_1(\theta) = F_1(\theta + 2\pi)$ , a special solution of Eq (1) can be written

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Determination of the Tolerance Values for the Magnetic Field  
Parameters in Accelerators, Using Eigenfunctions

down in the form of the series given by Eq (2), where  $y_k(\theta)$  are complex eigenfunctions of the operator  $L = d^2/d\theta^2 + Q(\theta)$  and  $\lambda_k$  are the corresponding eigenvalues. The coefficients  $a_k$  are determined by Eq (3), where  $u(\theta)$  is a certain "weight" function which is introduced for convenience. The eigenfunctions  $y_k(\theta)$  satisfy the same boundary condition as the function  $F_1(\theta)$  and are of the form given by Eq (4). In Eq (4)  $\mu_k = 2k\pi/N$  and  $C_k$  is a normalizing factor which can be determined using the condition given by Eq (5). The function  $f_k(\theta)$  is given by  $f_k(\theta) = Y_{1k}(\theta) + iY_{2k}(\theta)$ , where  $Y_1(\theta)$ , and  $Y_2(\theta)$  are two special periodic solutions of Eq (6) which satisfy the initial conditions  $Y_1(0) = 1$ ,  $Y_2(0) = 0$ ;  $Y_1'(0) = 0$ ,  $Y_2'(0) = 1$ . In general,  $Y_1$  and  $Y_2$  must be found by a numerical integration of Eq (6). Eigenfunctions can also be used to study the transition through resonances when the coefficients in Eq (1) and the "frequency"  $\mu = \mu_m$  are slowly varying. Using the method of variation of constants, the amplitude  $A$  is given by

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Determination of the Tolerance Values for the Magnetic Field  
Parameters in Accelerators, Using Eigenfunctions

Eq (7). In the case of a simple resonance ( $F(\theta, y) \equiv F_1(\theta)$ ), Eq (7) leads to Eq (8). If the particle passes through a resonance corresponding for example to the  $k$ th eigenfunction, i.e. when  $\mu(m_0) \simeq 2\pi k/N$ , then only the phase  $\gamma_k$  will vary slowly. After averaging, the solution of Eq (8) gives, after passage through a simple resonance, the expression for the amplitude  $A$  given by Eq (9). In the case of parametric resonance ( $F(\theta, y) = F_2(\theta)y$ ,  $F_2(\theta) = \sum_k b_k y_k$ ), the equation for  $A$  is of the form given by Eq (10). From Eq (10) it is clear that the dangerous harmonics are those whose "frequency"  $\mu_k$  is greater by a factor of 2 than the natural "frequency" of the system  $\mu$ , i.e.  $2\mu = \mu_k = 2\pi k/N$ . After averaging of Eq (10), the expression given by Eq (11) is obtained. Substituting  $A = a \exp(i\alpha)$  one obtains an approximate expression which describes the change in the amplitude after transition through parametric resonance and this is given by Eq (12), where  $v$  is the value of  $\delta - 2\alpha$  at the resonance point ( $\delta = \arg B$ ).

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SOV/120-59-5-3/46

Determination of the Tolerance Values for the Magnetic Field  
Parameters in Accelerators, Using Eigenfunctions

L. L. Sabsovich is thanked for reading the manuscript and for a number of valuable suggestions. There are 2 figures, 1 table and 9 references, 8 of which are Soviet and 1 English.

ASSOCIATION: Fizicheskiiy institut AN SSSR (Physical Institute,  
Ac.Sc., USSR)

SUBMITTED: July 21, 1958

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66591

~~21(9)~~ 21.2000

SOV/26-59-8-8/51

AUTHORS: Kolomenskiy, A.A., and Rabinovich, M.S., Doctors of Physical and Mathematical Sciences

TITLE: The Synchrophasotron -- the Largest Accelerator in the World

PERIODICAL: Priroda, 1959, Nr 8, pp 57-61 (USSR)

ABSTRACT: For the construction of a synchrophasotron with a capacity of 10 billion electron volts, the following scientists were awarded the Lenin Prize in 1959: V.I. Veksler, L.P. Zinov'yev, D.V. Yefremov, Ye.G. Komar, N.A. Monoszon, A.M. Stolov, A.L. Mints, F.A. Vodop'yanov, S.M. Rubchinskiy, A.A. Kolomenskiy, V.A. Petukhov, and M.S. Rabinovich. On the principle of self-phasing of particles discovered by V.I. Veksler in 1944, new accelerators of the type phasotron, synchrotron, and synchrophasotron have been installed. In April 1957, a synchrophasotron was put in operation at Dubna, capable of reaching 10 billion electron volts. The research work on this apparatus has been carried out in the FIAN, Fizicheskii institute im. P.N. Le-

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The Synchrophasotron — the Largest Accelerator in the World

bedeva Akademii Nauk SSSR (Institute of Physics imeni P.N. Lebedev at the AS of the USSR). Even during 1953-1955, a synchrophasotron of 180 million electron volts was under construction in cooperation with the Radiotekhnicheskiy institut AN SSSR (Radiotechnical Institute at the AS of the USSR). The installation of the synchrophasotron at Dubna was performed by the OIYaI, Ob"yedinennyi institut yadernykh issledovaniy (Joint Institute of Nuclear Research). Scientists of 12 countries took part in the installation of the apparatus. The electromagnet of the synchrophasotron consists of four circular sections, their radius is 28 m. The magnet ring of the accelerator, with a weight of 36,000 tons, rests on a concrete base weighing 15,000 tons. The electrical substation which feeds the electromagnet, consists of four units, the maximum capacity of which amounts to more than 140,000 kw, i.e. more than double the capacity of the Volkhovskaya GES (Volkhov GES). In the second half of 1958, the workers of the Laboratoriya vysokikh energiy OIYaI

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**The Synchrophasotron — the Largest Accelerator in the World**

(Laboratory of High Energies of the OIYaI) succeeded in increasing the intensity of the accelerated beam of protons by 10,000 times. Under the guidance of physicists Wang Ken-ch'ang (People's Rep. of China) and M.I. Solov' yev, a big propane chamber was installed which reveals the paths of the rapidly moving sub-atomic particles by the bubbles of the gas. A liquid-hydrogen chamber will facilitate research of the heavy K-mesons. New information on the synchrophasotron has been obtained from the Mezhdunarodnaya konferentsiya po fizike chastits vysokikh energiy (International Conference on the Physics of Particles of High-Energies) which was held at Kiyev in July 1959. Under the guidance of V.V. Vladimirskiy, a big accelerator of protons of 50-60 billion electron volts will be installed utilizing the principle of heavy focusing. The authors also mention that a model of a new cyclotron with approximately 1,000 times higher intensity has been given to the OIYaI by the scientists V.P. Dmitriyevskiy, V.P. Dzhelepov, and V.I. Zomolodchikov. Today intensive research work is

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**The Synchrophasotron -- the Largest Accelerator in the World**

carried on to develop new methods of acceleration of particles which are based on entirely different principles and, according to the author, will provide for the utilization of plasma. The diagram showing a synchrophasotron has been taken from the pamphlet "V Dubne pod Moskvoy" (At Dubna near Moscow) by P.I. Kapyrin and O.S. Sergeev. There is 1 diagram and 4 Soviet references.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva Akademii nauk SSSR/  
Moskva (Institute of Physics imeni P.N. Lebedev at the AS  
of the USSR/ Moscow) ✓

Card 4/4

AUTHORS: Kolomenskiy, A. A., Fang Sheng USC/56-36-1-38/62

TITLE: The Cyclic Motion of Charged Particles in an Electric Field  
(Tsiklicheskiye dvizheniya zaryazhennykh chastits v elektricheskoy pole)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959,  
Vol 36, Nr 1, pp 271-276 (USSR)

ABSTRACT: The radiation of relativistic electrons when moving in magnetic fields has, as is known, already been investigated by several papers, and many discussions have been held on this subject. Therefore it is, in principle, interesting to compare the results obtained by these papers with those resulting from the influence exercised by radiation upon the motion of electrons in a directioning electric field. Interest is also caused by the generalization of the principle of "autophasing" (avtofazirovka) for the cyclic motion in electric fields. This principle has hitherto been applied only to the motion of particles in a magnetic field. In the first chapter of the present paper the motion of particles in an axially-symmetric electric field was calculated without taking the influence exercised by radiation into account. Expressions are written

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The Cyclic Motion of Charged Particles in an  
Electric Field

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down for the components of this field. This motion is analyzed in a similar manner as for an axially-symmetric accelerator in a magnetic field. It is, above all, possible, as before, to use the conception of betatron-oscillations (both radial and vertical) and of synchrotron oscillations. However, there is also an essential qualitative difference between these two cases, which will be properly understood if both (i. e. the magnetic and the electric) directioning fields are considered to be constant with respect to time. In the case of the magnetic field, the force acting upon the particle is vertical to the direction of velocity, and particle energy does not vary. In the case of motion in an electric field, the force acting upon the oscillation particle is not always vertical to the direction of velocity. In this case particle energy no longer depends upon time but remains, on the average, constant. Expressions are given for the frequencies of betatron oscillations in the vertical and radial direction. Also for the stability of these oscillations a condition is written down. In the second part of this paper the motion of particles in an axially-symmetric field is then calculated in consideration

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The Cyclic Motion of Charged Particles in an  
Electric Field

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of the influence exercised by radiation. The terms due to radiation are then added to the previously written down equations. In first approximation radiation damps the amplitudes of oscillations. The expressions obtained herefore are analogous to the corresponding expressions for the case of the magnetic field. Also the quantum fluctuations of radiation can be taken into account in connection with the motion of an electron in axially-symmetric electric and magnetic fields. Also in the case of systems in a directioning electric field strong focusing may be used. There are 6 references, 3 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR  
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR)

SUBMITTED: July 24, 1958

Card 3/3

*Kolomenskiy, A.A.*

PHASE I BOOK EXPLOITATION

SOV/4098  
SOV/5-S-13

Akademiya nauk SSSR. Fizicheskiy institut

Teoriya uskoriteley. Fotoyadernyye reaktsii (Theory of Accelerators. Photomuclear Reactions) Moscow, 1960. 225 p. (Series: Its: Trudy, tom 13) Errata slip inserted. 2,500 copies printed.

Resp. Ed.: D.V. Skobel'tsyn, Academician; Tech. Ed.: Yu. V. Rylina.

**PURPOSE:** This collection of articles is intended for nuclear physicists interested in the theory of accelerators and photomuclear reactions.

**COVERAGE:** This collection of three articles, published by the FIAN (Physics Institute, Academy of Sciences, USSR) contains the work of A.A. Kolomenskiy, Ye. M. Moroz, and A.N. Gorbunov. Kolomenskiy is concerned with an investigation of the theory of particle movement in modern cyclic accelerators. The article by Moroz deals with a theoretical investigation of methods for increasing the efficiency of cyclic accelerators. The third article, by Gorbunov, discusses photodisintegration of helium. Bibliographies of Soviet and non-Soviet sources appear at the end of each article. The following personalities are mentioned:

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"APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000823910020-6"

Photomuclear Reactions

SOV/4098

A.N. Lebedev, L.L. Sabsovich, Academician V.I. Veksler, Director of FIAN;  
M.S. Rabinovich, P.A. Cherenkov, A.M. Baldin, Yu. M. Shirokov, Yu. K. Khokhlov,  
Aspirant V.V. Daragan, V.M. Spiridonov (deceased), A.G. Gerasimov, Yu. S. Ivanov,  
A.V. Kutsenko, V.A. Dubrovina, N.N. Novikova, A.I. Orlova, V.A. Osipova,  
V.S. Silayeva, K.V. Chekhovich and S.I. Shornikov.

TABLE OF CONTENTS:

Kolomenskiy, A.A. Investigation of the Theory of Particle Movement in Modern Cyclic Accelerators

The author discusses the following basic problems: linear and non-linear theory of betatron particle oscillations in magnetic periodic systems; critical energy in high-focusing synchrotrons; the effect of radiation upon motion of electrons in cyclic accelerators; theory of the ring cyclotron.

3

Moroz, Ye. M. Theoretical Investigation of Methods of Increasing the Efficiency of Cyclic Accelerators

The author discusses autophasing of accelerated particles; damping of synchrotron oscillations; effect of quantum fluctuations in radiation of electrons on synchrotron oscillations; the ideal cyclotron; the isochronous cyclotron; sector cyclotrons; and focusing of particles in sector cyclotron and cyclotrons with stable adjacent orbits.

130

Card 2/3

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S/089/60/008/06/09/021  
B006/B063 82310

AUTHORS: Kolomenskiy, A. A., Lebedev, A. N.

TITLE: Some Characteristics of Orbits in Accelerators<sup>19</sup> in the  
Light of the Similarity Principle

PERIODICAL: Atomnaya energiya, 1960, Vol. 8, No. 6, pp. 553-555

TEXT: Satisfying the similarity principle is of special importance for strongly focused accelerators with constant fields, where the orbital parameters undergo considerable changes during acceleration. As was shown in the paper of Ref. 1, the following expression holds for the magnetic field if the dynamic similarity principle of plane orbits is satisfied:  $H_z = f(\theta)r^{n_0}$ .  $H_z$  is the field component perpendicular to the orbital plane,  $f(\theta)$  - an arbitrary periodic function,  $r$  and  $\theta$  - the cylindrical coordinates of the orbital point,  $n_0 = \text{const}$ . The present "Letter to the Editor" deals with some universal characteristics of the motion of particles in such systems. First, the authors study the effect

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Some Characteristics of Orbits in  
Accelerators in the Light of the Similarity  
Principle

S/089/60/008/06/09/021  
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of the dynamic similarity principle upon the shape of the orbits. However, this principle influences not only the orbital geometry, but has also a considerable effect on the dynamic characteristics of the accelerated particles. In several cases, the similar orbits proved to be analogous to circular orbits. This becomes particularly manifest in the study of radiation effects in accelerators with constant fields. Radiation leads to positive or negative damping of the betatron and synchrotron vibrations with decrements given in formula (10). These expressions are transformed for the case in which the orbits consist of arcs of constant curvature, and in which the similarity principle is satisfied. In the case of conservation of similarity it is not possible to obtain damping systems working due to the coupling of radial with synchrotron vibrations. Numerical estimates have shown that an efficient damping in a ring-type phase-modulated electron accelerator (as the one described in the paper of Ref. 5) makes it necessary to introduce a longitudinal magnetic field amounting to about 10 per cent of the guide field. There are 5 references: 4 Soviet and 1 CERN.

Card 2/5  
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X

S/057/60/030/011/006/009  
B006/B054

AUTHOR: Kolomenskiy, A. A.

TITLE: The Theory of Particle Motion in an Accelerator of  
Variable Multiplicity - a Microtron 19

PERIODICAL: Zhurnal tekhnicheskoy fiziki, 1960, Vol. 30, No. 11,  
pp. 1347-1354

TEXT: The microtron suggested by V. I. Veksler, a cyclic resonance accelerator of variable multiplicity, differs from a cyclotron mainly in that the course of resonance acceleration is not disturbed by the relativistic mass increase of the particles; in contrast to other accelerators, the particles are captured in every cycle of the electric high-frequency acceleration field. This microtron is particularly suited as an electron accelerator which supplies a monoenergetic, but not high-energetic, beam. It was also suggested using it as an injector for other accelerators, or as a millimeter wave generator. The theory of the microtron has been developed to a relatively small extent as yet, particularly with respect to the phase motion of particles; therefore, the present

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The Theory of Particle Motion in an Accelerator  
of Variable Multiplicity - a Microtron

S/057/60/030/011/006/009  
B006/B054

paper describes a method of studying the behavior of particle phases in the microtron. The method is based on the use of finite-difference equations. It is described for one space of acceleration 0, i.e., the endovibrator to which an electric alternating voltage  $V = V_0 \cos 2\pi/T_0 t$  and a constant homogeneous magnetic field are applied. The particle orbits form a family of circles with the common point 0 (Fig. 1). The author obtains the phase equations for small and large phase oscillations. In the last part of the paper, he shows how to solve analytically the equation obtained for  $\eta_k$  by the method of successive approximations. For the phase  $\varphi_k$  (after  $k$  acceleration cycles), the following relation holds:

$\varphi_k = \varphi_s + \eta_k$ ;  $\eta_k \ll \varphi_s$ , where  $\varphi_s$  is the equilibrium phase. Here, the author proceeds from the ansatz  $\eta_{k+2} - 2\cos\varphi_s \eta_{k+1} + \eta_k = F(\eta_{k+1})$ , which permits a solution in the form  $\eta_k = \varepsilon \eta_k^{(1)} + \varepsilon^2 \eta_k^{(2)} + \varepsilon^3 \eta_k^{(3)} + \dots$ .  $\eta_0$  or  $\eta_1$  is chosen as the parameter  $\varepsilon$ . There are 4 figures and 7 references: 4 Soviet, 1 British, 1 Danish, and 1 US.

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*Inst. of Physics im P. N. Lebedev, AS USSR*

KOLOMENSKIY, A.A.

Injector accumulator for a proton synchrotron. Prib. i tekhn. eksp.  
6 no.1:19 Ja-F '61. (MIRA 14:9)

1. Fizicheskiy institut AN SSSR.  
(Synchrotron) (Protons)

KOLOMENSKIY, Andrey Aleksandrovich; LEBEDEV, Andrey Nikolayevich;  
KOZLOV, V.D., red.; MURASHOVA, N.Ya., tekhn. red.

[Theory of cyclic accelerators] Teoriia tsiklicheskikh uskori-  
telei. Moskva, Fizmatgiz, 1962. 352 p. (MIRA 15:11)  
(Particle accelerators)

24.6730

41570  
S/057/62/032/010/008/010  
B104/B102

AUTHORS: Kolomenskiy, A. A., and Lebedev, A. N.

TITLE: Use of parameter random modulation in cyclic accelerators and in similar systems

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 10, 1962, 1237-1244.

TEXT: A study is made of the particle motion in periodic systems whose parameters are subject to small time-dependent random fluctuations. An attempt is made to define characteristics describing the resonant excitation of betatron oscillations associated with parameter fluctuations. The

disturbed motion is described by  $x'' + (\nu^2 + \xi(\nu))x = F(\nu)$  (1.1) where  $x$  is the deviation from the orbit,  $\nu$  the ideal betatron oscillation,  $\nu$  the generalized azimuth;  $F(\nu)$  and  $\xi(\nu)$  describe various disturbances;  $\xi(\nu)$  consists of two components:  $\xi(\nu) = \xi_n(\nu) + \xi_c(\nu)$  where  $\xi_n(\nu)$  is connected

with the asymmetry of the refractive index of the magnetic field and has the period  $2\pi$ , and  $\xi_c(\nu)$  is a random function. Solutions are sought in the form  $x = a \exp(i\nu\nu) + c.c.$  (1.3). These relations are used to obtain  
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Use of parameter random .....

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B104/B102

$$u' = \frac{1}{2iv} [F(\vartheta) e^{-i\vartheta} - a\varepsilon(\vartheta) - a^* \varepsilon^*(\vartheta) e^{-2i\vartheta}] \quad (1.4)$$
 from (1.1), here the first term in the brackets corresponds to an external resonance force and the second term describes the phase modulation of the disturbances; the third term is essential only if  $\nu \approx k/2$  (parametric resonance) or if  $\varepsilon_{cn}(\vartheta)$  has a harmonic of  $\omega \approx 2\nu$  in its spectrum.  $\varepsilon_{cn}(\vartheta)$  is assumed to be a relatively slow-random process without any resonant harmonics, so that no noise parametric resonance is excited. In the case of external resonance ( $\varepsilon_n = 0$ ,  $\nu = k + \Delta$ ,  $\Delta \ll 1$ ,  $k = \text{integer}$ ) the system  $u' = h_n \sin[\Delta\vartheta + \xi(\vartheta)]$ ,

$$v' = h_n \cos[\Delta\vartheta + \xi(\vartheta)], \quad (1.6)$$

$$\left. \begin{aligned} u + iv &= -a \exp(-i\xi) \\ \xi(\vartheta) &= \frac{1}{2\nu} \int \varepsilon_{cn} d\vartheta, \quad h_n = \frac{|F_k|}{2\nu} \end{aligned} \right\} \quad (1.7)$$

(1.4) is obtained from where  $F_k$  is the  $k$ -th harmonic of  $F(\vartheta)$ . For parametric resonance ( $F=0$ ,  $\varepsilon_n \neq 0$ ,  $\nu = \frac{k}{2} + \Delta$ )

$$u' = h_n [u \cos 2(\xi + \Delta\vartheta) + v \sin 2(\xi + \Delta\vartheta)], \quad (1.10) \text{ is}$$

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$$h_n = \frac{|\varepsilon_k|}{2\nu}$$

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B104/B102

Use of parameter random ...

obtained from (1.4). If the correlation time of the random process  $\xi(\vartheta)$  is much smaller than the period in which  $u$  and  $v$  are changed, the position of the mapping point in the  $(u, v)$  plane is described with the aid of the distribution function  $W(u, v, \vartheta)$  that satisfies the Einstein-Fokker equation  $\frac{\partial W}{\partial \vartheta} + \frac{\partial}{\partial u} \overline{\delta u} W + \frac{\partial}{\partial v} \overline{\delta v} W = \frac{\partial^2}{\partial u^2} \frac{(\overline{\delta u})^2}{2} W + \frac{\partial^2}{\partial v^2} \frac{(\overline{\delta v})^2}{2} W + \frac{\partial^2}{\partial u \partial v} \overline{\delta u \delta v} W$ . (2.1). With (1.6)

and (1.10) and assuming that  $\xi(\vartheta)$  is a steady process with a dispersion  $\sigma$  the mean displacements entering in (2.1) are obtained for both types of resonance:

$$\left. \begin{aligned} \overline{\delta u} &= h \overline{\sin(\Delta\vartheta + \xi)} = h_1 e^{-\frac{\sigma^2}{2}} \sin \Delta\vartheta \\ \overline{\delta v} &= h \overline{\cos(\Delta\vartheta + \xi)} = h_1 e^{-\frac{\sigma^2}{2}} \cos \Delta\vartheta \end{aligned} \right\} (2.2a),$$

$$\left. \begin{aligned} \overline{(\delta u)^2} &= \frac{h_1^2}{2} (J_1 + J_2 \cos 2\Delta\vartheta), \\ \overline{(\delta v)^2} &= \frac{h_1^2}{2} (J_1 - J_2 \cos 2\Delta\vartheta), \\ \overline{\delta u \delta v} &= -\frac{h_1^2}{2} J_2 \sin 2\Delta\vartheta, \end{aligned} \right\} (2.4)$$

$$\cdot (\text{external resonance}), \quad \left. \begin{aligned} \overline{\delta u} &= h_1 e^{-2\sigma^2} (v \cos 2\Delta\vartheta + u \sin 2\Delta\vartheta) \\ \overline{\delta v} &= h_1 e^{-2\sigma^2} (u \cos 2\Delta\vartheta - v \sin 2\Delta\vartheta) \end{aligned} \right\} (2.2b),$$

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Use of parameter random ...

$$\left. \begin{aligned} \frac{(\delta v)^2}{2} &\approx \frac{(\delta u)^2}{2} \approx (u^2 + v^2) D_n; & \overline{(\delta u \delta v)} &\ll (u^2 + v^2) D_n, \\ D_n &= \frac{h_n^2}{2} J_1(2\sigma). \end{aligned} \right\} (2.6b) \text{ where}$$

$$J_1(\sigma) = e^{-\sigma^2} \int_0^\infty (e^{iR(\tau)} - 1) d\tau; \quad J_2(\sigma) = e^{-\sigma^2} \int_0^\infty (1 - e^{-iR(\tau)}) d\tau. \quad (2.5), \text{ (parametric resonance)}$$

These relations lead to Einstein-Fokker equations for both types of resonance. For external resonance it is shown that the rate of the dynamic build-up of the oscillations diminishes by a factor of  $\exp(-\sigma^2/2)$ . At the same time the amplitudes increase stochastically, in proportion to  $\sqrt{t}$ . With parametric resonance the Einstein-Fokker equation cannot be solved analytically. It is shown that the noise modulation of the oscillation frequency reduces the dynamic effect of parametric resonance. However, this modulation causes simultaneously a stochastic build-up of the oscillations, characterized by the diffusion coefficient. Finally, an estimate is made of the interval  $\mathcal{U}$  in which the system is in resonance before the mean square betatron oscillation amplitude rises to a considerable amount.  $\mathcal{U}_{\max}$  satisfies the inequality  $\mathcal{U}_{\max} \leq \sqrt{2} \mathcal{U}_n^2$  and in the dynamic case has the

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B104/B102

Use of parameter random ...

value  $\nu_{\max} = \frac{1}{2h_n}$ . In the ideal case, when a noise exists, the possible

holding time increases to the  $\nu/\sqrt{h_n}$  times. There are 2 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moskva  
(Physics Institute imeni P. N. Lebedev AS USSR, Moscow)

SUBMITTED: November 30, 1961

Card 5/5

KOLOMENSKIY, A.A.; LEBEDEV, A.N.

Autoresonance motion of a particle in a plane electromagnetic wave. Dokl.AN SSSR 145 no.6:1259-1261 Ag '62. (MIRA 15:8)

1. Fizicheskiy institut im. P.N.Lebedeva AN SSSR. Predstavleno akademikom V.I.Vekslerom.

(Dynamics of a particle) (Electromagnetic waves)

L 9920-63 EWT(1)/BDS/EEC(b)-2/ES(w)-2--AFFTC/ASD/ESD-3/  
SSD--PI-4/Pab-4/Pe-4--IJP(C)

ACCESSION NR: AP3000006

S/0057/63/033/005/0537/0543

AUTHOR: Barsukov, K. A.; Kolomenskiy, A. A.

73  
72

TITLE: On the longitudinal stability of a charged beam circulating in a medium

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 33, no. 5, 1963, 537-543

TOPIC TAGS: circulating beam stability, negative mass effect, particle beams, plasmas

ABSTRACT: The peculiar longitudinal instability of a circulating beam of charged particles associated with the "negative mass effect", discussed for the case of a vacuum by Kolomenskiy, A. A., and Lebedev, A. N. (Proc. of the CERN Symposium of High Energy Accelerators, Geneva, p. 115, 1959) and by Nielson, C. E., Sessler, A. M., and Symon, K. R. (Ibid., p. 239) is considered in the more general case when the particles circulate in a medium characterized by a dielectric constant and magnetic permeability different from unity. The results should have practical importance in connection with particle beams circulating in a plasma. The dispersion equation for the longitudinal oscillations of a beam

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ACCESSION NR: AP3000006

of charged particles circulating in a toroidal waveguide (of arbitrary cross section) filled with a dielectric medium is obtained in a general form, and conditions for the stability of the oscillations are derived. The effect of the medium is not simple: under some conditions a beam that would be unstable in vacuo is stabilized in the presence of the medium, while under other conditions the medium unstabilizes a beam that would be stable in vacuo. Analytic approximations to the stability conditions are discussed briefly in an appendix, and the case of a toroidal waveguide of circular cross section filled with an electron plasma is considered in some detail. Orig. art. has: 33 equations and 2 figures.

ASSOCIATION: Fizicheskii institut im. P. N. Lebedeva AN SSSR, Moskva (Physical Institute, AN SSSR, Moscow)

SUBMITTED: 03May62    DATE ACQ: 12Jun63    ENCL: 00  
SUB CODE: PH    NR REF SOV: 002    OTHER: 002

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KOLOMENSKIY, A.A.; LEBEDEV, A.N.

Resonance phenomena in the motion of a particle in a plane  
electromagnetic wave. Zhur. eksp. i teor. fiz. 44 no.1:261-269  
Ja '63. (MIRA 16:5)

(Dynamics of a particle)

(Electromagnetic waves)

KOLOMENSKIY, A.A., glav. red.; KUZNETSOV, A.B., red.; LEBEDEV,  
A.N., red.; ALYAB'YEV, A.F., red.; MURADOVA, A.A., red.;  
SMIRNOV, I.P., red.

Transactions of the International Conference on High  
Energy Accelerators. Trudy Mezhdunarodnoi konferentsii  
po uskoriteliam. Pod red. A.A.Kolomenskogo, A.B.Kuznetsova,  
A.N.Lebedeva. Moskva, Atomizdat, 1964. 1091 p. [In Rus-  
sian and English] \_\_\_\_ List of participants of the International  
Conference on High Energy Accelerators. Spisok uchastnikov Mezhdunarodnoi konferentsii po uskoriteliam (Dubna, 21-27 avgust 1963 g.). Moskva, Atomizdat, 1964. 13 p. (MIRA 17:9)

1. International Conference on High Energy Accelerators. Dubna, 1963. 2. Fizicheskiy institut im. P.N.Lebedeva AN SSSR, Moskva (for Kolomenskiy, Lebedev).

FWT(m)/EPA(w)-2/EWA(m)-2 Pub-10/Pt-7 IJP(c) OS

AT5007925

5/2000/64/100/000/0365/0367

Malomanskiy, A. A.; Lebedev, A. M.; Fateyev, A. P.

Interaction of colliding beams in storage systems

International Conference on High Energy Accelerators Dubna, 1963.  
M. Atomizdat, 1964, 365-367

High energy accelerator, charged particle beam, plasma physics

The theoretical investigation of the dynamics of beams in storage systems into consideration their electrodynamic interaction is involved in difficulties and requires the solution of difficult kinetic equations. The present report, therefore, discusses the qualitative picture of the phenomena on the basis of certain simplified model representations which in one way or another the specifics of storage systems. The given expressions are related to so-called concentric systems and particularly to synchrotrons, where the colliding beams of identical particles intersect several times. The report discusses only the behavior of orbits of two-state beams which circulate in an ideal magnetic field and lie in one plane. It is concluded that the effects enumerated in the report do not by any

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at the behavioral peculiarities of the arcs for large currents. The  
must be essentially complicated through a possible splitting of the  
dimension, through the appearance of specific plasma instabilities,  
other effects. Orig. art. has 3 figures.

Plazmennyy institut imeni P. N. Lebedeva AN SSSR (Physics Institute

20 May 64

ENCL: 00

SUB CODE: NP

002

OTHER: 070

ACCESSION NR: AT5007928

6/0000/54/000/000/0329/0093-2

Yarsakov, K. A.; Kolomenskiy, A. A.

22  
B+1

...ability of a charged ...

... retard-

International Conference on High Energy Accelerators. Dubna, 1966.  
Moscow, Atomizdat, 1967, 398-399

high energy accelerator, charged particle beams, plasma physics

[illegible]

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1. IDENTIFICATION NR: AT5007928

beam can circulate in a wave-guide with diaphragms, and also in a dielectric medium, or in a channel drilled in it, or in any other retarding system. The criterion of stability of a beam in a retarding system is also investigated.

for a wave-guide with dielectric filler in the case of a toroidal ring with ideally conducting walls in which a beam of charged particles circulate. Also discussed is the stability of a beam.

The potential variation in the direction governing the stability of a circulating beam and must certainly be taken into consideration in an investigation of accelerator, storage, and other systems.

report for the case of a diaphragm wave-guide also revealed a number of

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... for the variation of the criterion of beam stability. For example,  
stability of the beam as a function of the parameters (e.g.,  
oscillation in the diaphragm) can be graphically represented.

... Institut imeni P. N. Lebedev

... Institute

ENCLOSURE

ED, NR

OTHER: 002

ACCESSION NR: AP4042262

S/0089/64/017/001/0057/0058

AUTHOR: Kolomenskiy, A. A.

TITLE: Longitudinal instability of charged beam circulating in an accelerator or in a storage ring with finite chamber wall conductivity

SOURCE: Atomnaya energiya, v. 17, no. 1, 1964, 57-58

TOPIC TAGS: cyclic accelerator, beam instability, strong focusing accelerator, frequency dependence

ABSTRACT: In view of recent observations (F. Mills et al. "Trudy\* Mezhdunarodnoy konferentsii po uskoritelyam," (Trans. Intern. Conf. on Accelerators), Dubna, 1963, M. Atomizdat, 1964) of possible instability in a charged circular beam when  $d\omega/dE < 0$  ( $\omega$  -- particle circular frequency,  $E$  -- particle energy), and in view of the importance of this problem to modern accelerators and storage rings, the author analyzed the longitudinal stability of a circulating beam,

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assuming finite chamber wall conductivity. In such a case the azimuthal component of the electric field does not vanish on approaching the walls and contains a component that is out of phase with the current, resulting in an instability due to the gradual transfer of energy from the beam to the growing electromagnetic wave. Although this instability is not connected in principle with the circulation of the beam and can arise also when the beam moves along a straight line, nevertheless the circulation of the beam imparts to this phenomenon new properties which depend on the absolute magnitude, on the sign of the derivative  $dw/dE$  and on the energy spread  $\Delta E/E$ , as well as on other parameters characteristic of cyclic accelerators and storage rings. The stability is investigated by a method previously employed by the author (Atomnaya energiya v. 7, 549, 1959; Proc. Intern. Conf. on High-Energy Accel., CERN, Geneva, 1959, page 115), using the negative-mass effect. And the results confirmed the possibility of a peculiar "impedance" instability. The time of development of this instability and conditions for its suppression are also

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estimated. In particular, it is shown that by making the energy spread large it becomes possible to suppress the instability. An estimate of the instability of development time for different cases shows in particular that this instability can be dangerous in strong-focusing accelerators or storage rings with weakly relativistic energies and a small energy spread. Orig. art. has: 16 formulas.

ASSOCIATION: None

SUBMITTED: 19Mar64

ENCL: 00

SUB CODE: NP

NR REF SOV: 004

OTHER: 002

Card 3/3

L 1223-66 EWT(m)/EPA(w)-2/EWA(m)-2 IJP(c) GS  
ACCESSION NR: AT5007945

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39  
35  
121

AUTHOR: Kanunnikov, V. N.; Kolomenskiy, A. A.; Ovchinnikov, Ye. P.; Troyanov, Ye. F.; Fateyev, A. P.; Yablokov, B. N.

TITLE: Some results of the work on starting the symmetrical electron ring-phasc-  
tron at FIAN

19  
SOURCE: International Conference on High Energy Accelerators. Dubna, 1963.  
Trudy. Moscow, Atomizdat, 1964, 653-657

TOPIC TAGS: electron accelerator, synchrotron

ABSTRACT: The Physics Institute im. P. N. Lebedev, AN SSSR, is developing new ac-  
cellerators of the ring-phasotron type. The principal idea of the development is  
to replace the growth of the magnetic field in time, which holds true in the case  
of synchrotron-type accelerators, by its growth in space in correspondence with  
the growth of the particles' energy. This permits increasing the intensity of the  
beam of accelerated particles, and also, by utilizing the accumulation of particles  
in a constant field, realization of the method of counter collisions of relativis-  
tic particles. As has been clear from the very beginning of the work, the com-  
plexity and novelty of the problem could not permit the work to be limited to theo-

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retical investigations. It was decided to construct a comparatively small accelerator, the symmetrical 30-Mev electron ring-phasotron, ensuring the simultaneous acceleration of two electron beams moving in opposite directions. This accelerator has to serve as a sufficiently flexible and resourceful basis for experiments on the creation of strong-current accelerators and accumulators. It was planned, in particular, to investigate with it various injection alternatives, accelerator regimes, and also the process of storing one and two counter beams. The principal results of the theoretical and experimental works completed in connection with the development of this accelerator have been published (V. N. Kanunnikov, et. al., Proc. International Conference on High Energy Accelerators, CERN, 1959, p. 89). The present report describes the main difficulties which were overcome in the initial period of starting the installation, and notes the results obtained up to the present moment. The principal parameters of the ring-phasotron are discussed, as well as the measurement and correction of its magnetic field. The characteristics of the beam during static operation are investigated. "The authors wish to thank for their participation workers of various organizations, especially the associates of the Physics Institute: V. S. Voronin, L. N. Kazanskiy, D. D. Krsil'nikov, A. N. Lebedev, S. S. Semenov, and of the Scientific-Research Institute of Electro-

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